

$$3^{x-4} = 5$$

Method I:

$$\ln 3^{x-4} = \ln 5$$

$$(x-4) \ln 3 = \ln 5$$

$$x-4 = \frac{\ln 5}{\ln 3}$$

$$x = \frac{\ln 5}{\ln 3} + 4$$

$$x \approx 5.46$$

$$3^{x-4} = 5$$

Method II:

$$\log_3 5 = x-4$$

$$4 + \log_3 5 = x$$

Change of Base

$$\log_3 5 = \frac{\ln 5}{\ln 3}$$

$$\log_b M = \frac{\ln M}{\ln b}$$

$$4 + \frac{\ln 5}{\ln 3} = x$$

$$x \approx 5.46$$

Quiz Tues 26th 7.2

7.4 Trig Functions of any Angle:

No longer restricted to $0^\circ < \theta < 90^\circ$

Q II	Quadrant I
Q III	Q IV

CAST Rule: Indicates the signs of the 6 trig functions in each quadrant

S	A
T	C

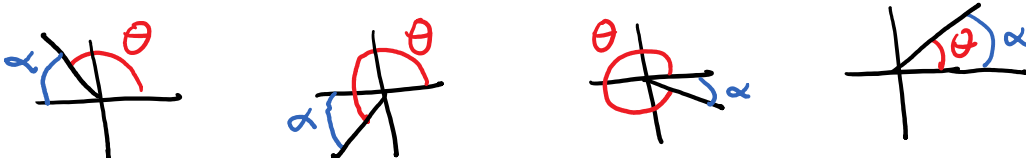
"All Students Take Calculus"

Sine	All	← all 6 trig functions are > 0 in QI
Tangent	Cosine	← $\cos \theta, \sec \theta > 0$ $\sin \theta, \csc \theta, \tan \theta, \cot \theta < 0$

↑

$\tan \theta, \cot \theta > 0$
 $\sin \theta, \csc \theta, \cos \theta, \sec \theta < 0$

Reference angle α : angle to x -axis



FACT

$$\sin \theta = \pm \sin \alpha$$

$$\cos \theta = \pm \cos \alpha$$

$$\cot \theta = \pm \cot \alpha$$

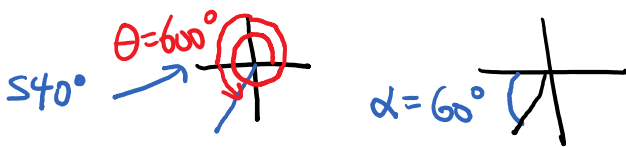
etc.

where α = reference angle

Sign comes from CAST Rule

Ex: Compute $\sin 600^\circ$

1) Reference Angle



$$\sin 600^\circ = \pm \sin 60^\circ$$

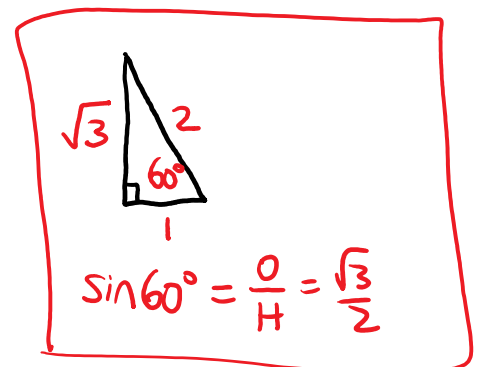
2) CAST Rule

S	A
T	C

$$\sin \theta < 0$$

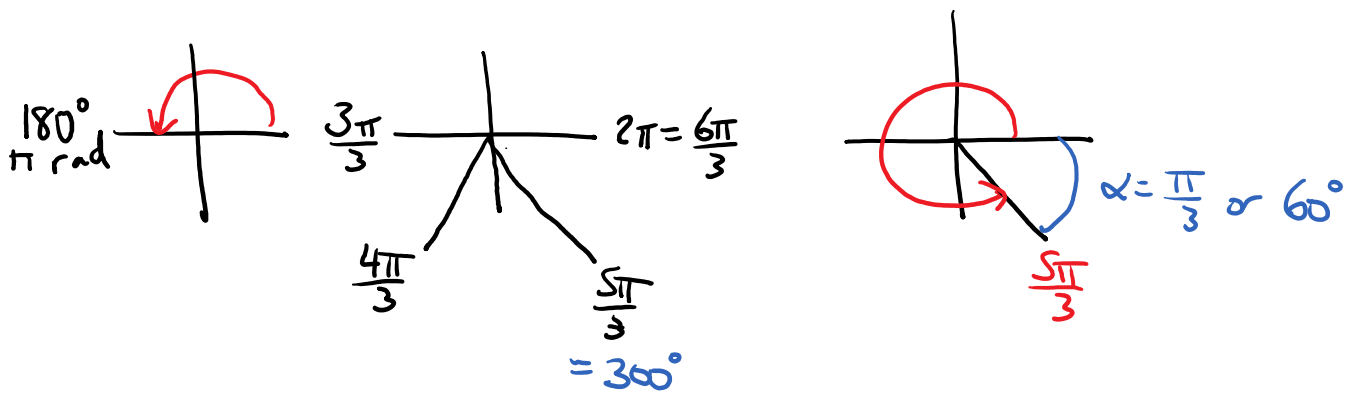
$$\sin 600^\circ = - \sin 60^\circ$$

$$= - \frac{\sqrt{3}}{2}$$



Ex: Find $\cot \frac{5\pi}{3}$

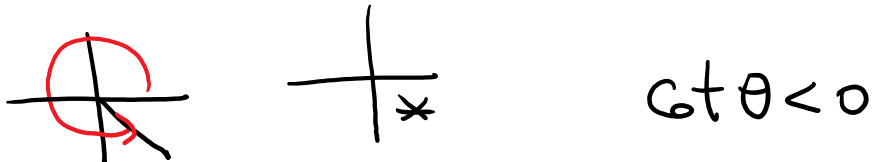
1) Reference angle



$$\cot \frac{5\pi}{3} = \pm \cot \frac{\pi}{3}$$

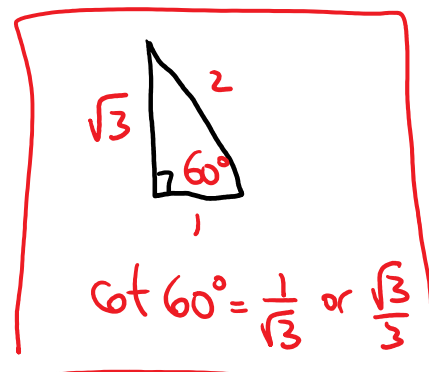
$$= \pm \cot 60^\circ$$

2) CAST Rule



$$\cot \frac{5\pi}{3} = - \cot \frac{\pi}{3} \quad \text{or} \quad - \cot 60^\circ$$

$$= -\frac{1}{\sqrt{3}} \quad \text{or} \quad -\frac{\sqrt{3}}{3}$$



Ex: Given $\cos \theta = -\frac{1}{4}$ and $\sin \theta < 0$,
find the other 5 values.

Which quadrant is θ in?

S | A

S	A
T	C

$\tan \theta > 0$
 $\cot \theta > 0$
 other 4 < 0